Prevalence of peptic ulcer in India: an endoscopic and epidemiological study in urban Kashmir

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SUMMARY   The prevalence of peptic ulcer disease in the general population of Kashmir, India, was determined by endoscopy in a randomly selected sample population of 2763 adults aged 15 years and above who were interviewed using a questionnaire. Of 239 persons with ulcer symptoms, 193 (80·7%) had an oesophagogastroduodenoscopy. A randomly selected 177 individuals from among the remaining population without ulcer symptoms, were also endoscoped. The point prevalence of peptic ulcer was 4·72% and the lifetime prevalence was 11·22%. The duodenal to gastric ulcer ratio was 17·1:1. Duodenal and gastric ulcer were common in men. The prevalence of peptic ulcer increased with age, with a peak prevalence of 28·8% in the 5th decade of life. Peptic ulcer was not related to socio-economic status. The prevalence of complications, such as bleeding, stenosis, or perforation were similar to those reported in the West.

Peptic ulcer is common among adults in modern society. The physical morbidity and economic incapacity associated with this disease justify continued interest in its epidemiology. Studies from the West reveal that 5–10% of the adult population can expect to develop a peptic ulcer during their life time.[1-3] Most previous epidemiological data have dealt with autopsy, surgery, clinically diagnosed cases, and/or barium studies.[4] From clinical experience and retrospective hospital based surveys, it has been suspected that peptic ulcer is widely prevalent in India, more common among the population of South India than North India and the clinical behaviour of peptic ulcer in India is different from that in the West.[5-6] We report on an endoscopic study in a randomly selected adult population in Kashmir, India, designed to measure the prevalence of peptic ulcer disease.

Methods

SUBJECTS
The city of Srinagar, the summer capital of the State of Jammu and Kashmir, India has seven divisions with a population of 561 050 (Master Plan, Srinagar Development Authority). The study was planned in Division B (North) with a population of 109 667 consisting of 22 zones (51 areas). A randomly drawn sample of 12 areas with a population of 2763 adults aged 15 years and above formed the present study.

Each house in these areas was visited by a team consisting of two doctors and two health visitors trained in epidemiology and nutrition. All subjects were personally interviewed by the team using a predefined questionnaire requesting personal particulars, habits and medical history including previous surgery. All available previous medical records were assessed. A search for inpatient records

was made for those with previous hospitalisation. On the basis of this information, the individuals were divided into: (1) those with symptoms suggestive of ulcer disease; and (2) those without ulcer symptoms.

Any one or more of the following criteria were taken to define a person with symptoms suggestive of ulcer disease: (1) Upper abdominal pain relieved by food and/or antacids lasting for more than two weeks either recently or in the past five years. (2) A previous radiological examination of upper gastrointestinal tract revealing evidence of peptic ulcer. (3) History of haematemesis or malaena. (4) Previous hospital records suggestive of ulcer disease.

These who had previous surgery for ulcer disease were not included in any of these groups and were classified as having definite ulcers.

All subjects with symptoms suggestive of ulcer disease were invited to attend the Department of Gastroenterology, Sher-i-Kashmir Institute of Medical Sciences, Srinagar (Kashmir) for oesophagogastroduodenoscopy. Those who attended the department were defined as 'responders' against 'non-responders' who did not comply even after a second invitation. A randomly selected 177 individuals, representative of the remaining population without ulcer symptoms were also endoscoped.

All endoscopic examinations were performed by one of two examiners (MSK, RM) using GIF QW or GIF Q10 panendoscope (Olympus) on subjects who had fasted overnight, using light sedation (diazepam 5–10 mg iv). The endoscopist was unaware of the clinical status of those examined and all endoscopic findings were recorded. Acute ulcer was defined as an area of denuded epithelium (>5 mm) with or without slough at the base. Chronic ulcer was defined as an ulcer with or without slough at the base, with scarring and deformity. Healed ulcer was inferred, if endoscopy revealed a scar with or without deformity. Peptic ulcer included duodenal ulcer and benign gastric ulcer. All gastric ulcers detected an endoscopy were biopsied for histological examination. The data were analysed for point prevalence and lifetime prevalence of peptic ulcer in an adult urban population.

Point prevalence was defined as the frequency of active ulcer disease in a specified population at a given point in time.[1] Life time prevalence was defined as a period prevalence where the period of time was each individual life time – that is, the proportion of the population who had had a peptic ulcer disease at some time in their lives. Calculation of life time prevalence was based on endoscopic proof of active or healed ulcer and previous ulcer surgery.[1] Those with clinical or radiological diagnosis of peptic ulcer without an endoscopic proof, were not considered to have peptic ulcer for statistical analysis.

The formula used for calculating the prevalence was:-

$$\text{Prevalence} = \frac{F1+F2+F3}{\text{All persons aged 15 yr and above.}} \times 100$$

F1 = estimated number of peptic ulcer in ulcer symptoms (US) group. It was calculated by

$$F1 = \frac{\text{No of ulcers detected on endoscopy in US group}}{\text{No of responders* in US group}} \times \text{No of persons* with US}$$

F2 = Estimated number of peptic ulcer in non ulcer symptom (NUS) group. It was calculated by

$$F2 = \frac{\text{No of ulcers detected on endoscopy in NUS group}}{\text{No of persons* endoscoped in NUS group}} \times \text{No of persons* with US}$$

F3 = No of persons with previous gastric surgery for peptic ulcer.

*Excluding individuals with previous gastric surgery for ulcer disease.

It was presumed that: (1) The frequency of ulcer disease in individuals with ulcer symptoms in responder group would be similar to that in the non-responder group as the age and sex structure, clinical symptoms, smoking habits, and socio-economic status were comparable in both groups (Table 1). (2) The frequency of ulcer disease in a randomly selected sample population with non-ulcer symptoms, represented the disease prevalence in this population at large, as the two groups were comparable (Table 1).

The socio-economic status of an individual was assessed on the basis of a modified Kuppuswami classification which is the most widely used method in India and is based on three variables: occupation, education, and monthly income. Each of the three variables was given weighted scores – that is, education was graded on a scale of 1–7, the highest being assigned to people with professional degrees; occupation was graded on a scale of 1–10, the maximum score being given to a highly qualified professional and the lowest to an unemployed; and income was rated from 1 to 12, those having a monthly income of above Rs 2000/- (approx UK £75) scoring the highest and those earning less than rupees 100 (approx UK £4) per month scoring the lowest. Subject with a total score of 26 and above were considered 'upper' between 11 and 25 'middle' and 10 and below 'lower' socio-economic class people.[7]

The observations of different parameters were analysed by Students *t* test and individual variables were examined with χ^2 test.

This study was approved by the ethical committee of the Sher-i-Kashmir Institute of Medical Sciences,

Table 1 *Comparison of age, sex, clinical status, socio-economic status and smoking habits between responders and non-responders in ulcer symptom group, and between persons endoscoped and the remaining population in non-ulcer symptom group*

		Ulcer symptoms group				Non-ulcer symptoms group			
	Responders n=193	Non-responders n=46	Test of significance	p value	Persons endoscoped n=177	Remaining population n=2347	Test of significance	p value
Age (yr), mean (SD)	36·9 (6·3)	35·5 (6·7)	t	>0·05	36·7 (6·3)	36·5 (7·2)	t	>0·1
Sex M:F	113:80	25:21	χ^2	>0·2	90:87	1232:1115	χ^2	>0·5
Symptom:								
Ulcer pain	155	37	χ^2	>0·5	–	–	–	–
GI bleed	38	9	–	–	–	–	–	–
Socio-economic class:								
Upper	36	9	χ^2	>0·5	35	468	χ^2	>0·5
Middle	112	27	–	–	91	1190	–	–
Lower	45	10	–	–	51	689	–	–
Smokers	101	24	χ^2	>0·5	45	594	χ^2	>0·5
Non-smokers	92	22	–	–	132	1753	–	–
Previous gastric surgery for ulcer disease	5	1	–	–	3	15	–	–

Soura, Srinagar. Detailed information about the endoscopic procedure was given to all persons at the time of personal interview and written consent was obtained from each individual before undergoing oesophagogastroduodenoscopy.

Results

A randomly selected sample of 2763 persons aged 15 years and above was surveyed. These included 1192 men and 1021 women. Of these 239 had symptoms

Table 2 *Endoscopic findings in 370 persons*

	Ulcer symptom group (193)	Non-ulcer symptom group (177)
Duodenum:		
Acute duodenal ulcer	2	–
Chronic duodenal ulcer	69	2
Healed duodenal ulcer	30	8
Deformity alone	4	2
Erosions and/or duodenitis alone	5	3
Round worm	–	4
Stomach:		
Acute gastric ulcer (benign)	1	–
Chronic gastric ulcer (benign)	10	–
Healed gastric ulcer (scar and deformity)	3	–
Stomal ulcers	3	–
Deformity alone	1	–
Erosions and/or gastritis only	20	12
Round worm	–	2
Polyp	–	1
Malignancy	1	2
Oesophagus:		
Oesophagitis	11	2
Benign nodule	–	2
Malignancy	–	1

suggestive of ulcer disease and 24 had previous gastric surgery for peptic ulcer disease. Endoscopies were performed on 193 subjects with ulcer symptoms and 177 without ulcer symptoms. The findings are shown in Table 2 and prevalence rates for peptic ulcer in this adult population are shown in Table 3. Duodenal ulcer to gastric ulcer ratio was 17·1:1. Duodenal ulcer was twice as common in men compared with women and benign gastric ulcer was four times more common in men than women. The prevalence of peptic ulcer increased with age with a steep rise in the fourth decade and a peak life time prevalence of 28·8% in the fifth decade of life (Table 4). The life time prevalence of peptic ulcer was distributed evenly in the different socio-economic strata of the population; 10·7% in upper (affluent), 11·9% in middle (average), and 11·1% in lower (poor) class.

Of the 149 persons with proven peptic ulcer (125 with endoscopic proof and 24 with previous ulcer surgery), 119 had ulcer pain as the dominant clinical presentation, 36 (24·1%) had bled in the past, 13 (8·7%) had gastric outlet obstruction, and six (4·0%) had perforated. Twenty four individuals had previous gastric surgery, six for gastroduodenal perforation, two for bleeding, two for gastric outlet obstruction, and 14 for intractable ulcer pain. Of the 24 individuals with previous gastric surgery for ulcer disease, six were found to have ulcer symptoms when interviewed during the survey. Five subjects were endoscoped, three had stomal ulcers, and one had a malignant gastric ulcer. Three of the remaining 18 asymptomatic individuals with previous gastric surgery, were endoscoped and no abnormality was found.

Of the 370 endoscopies performed, oesophageal

Table 3 *Prevalence of peptic ulcer disease in adults (per 100 persons)*

	Duodenal ulcer			Gastric ulcer			Peptic ulcer		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Point prevalence	4·22			0·50			4·72		
		5·62	2·81		0·80	0·20		6·42	3·01
Life time prevalence	10·60			0·62			11·22		
		14·02	7·20		0·99	0·24		15·01	7·44

carcinoma was seen in one subject and gastric carcinoma in three subjects. Two of the three subjects had an early gastric cancer and were asymptomatic.

Discussion

Earlier epidemiological studies on peptic ulcer have dealt with hospital admission rates, mortality rates, or autopsy surveys.[4] Such measures of frequency have inherent problems. They do not represent a reasonable sample of the total ulcer group or are biased by the severity of disease or are affected by physicians' prejudice about the appropriate means of treatment.[4] Selected population groups have been used for defining incidence and/or prevalence of peptic ulcer in the community – for example, Massachusetts physicians,[2] male factory workers in Tokyo,[8] and railway workers in South India.[9] These studies do not give an idea about the overall disease load in the general population, as such selected population samples do not have the same age and sex structure as the general population. The most reliable prevalence data can be obtained from prospective general population surveys, such as this study.

Estimating the prevalence of peptic ulcer is complicated by people who are asymptomatic but have ulcer craters; whilst others have symptoms even after the ulcer healing had occurred.[1] To circumvent these problems, we endoscoped a representative sample from an asymptomatic general population and the majority of the symptomatic group.

Table 4 *Decadewise prevalence of peptic ulcer per 100 persons*

Age group (yr)	Duodenal ulcer		Gastric ulcer		Peptic ulcer	
	Lifetime	Point	Lifetime	Point	Lifetime	Point
15–20	1·41	1·41	–	–	1·41	1·41
21–30	7·7	3·5	–	–	7·7	3·5
31–40	20·5	5·5	0·2	0·2	20·7	5·7
41–50	26·9	7·2	1·9	1·3	28·8	8·5
51–60	23·8	10·2	1·2	1·2	25·0	12·0
61 above	8·4	–	–	–	8·4	–

The diagnosis of peptic ulcer in previous studies has been made on clinical symptomatology alone and/or barium meal studies. Endoscopy, however, remains the most accurate way of diagnosing peptic ulcer and has an added advantage that target biopsies can be obtained from suspicious lesions. Active ulcers in the duodenal bulb can be differentiated from scars causing duodenal deformity. Barium meal has limitations in these contexts.

The point prevalence of peptic ulcer in the present study was 4·72% and the lifetime prevalence was 11·22%. This is an underestimate of the lifetime prevalence as the mean age of the population studied was only 36·3 yr; and, there may be quite a few peptic ulcers which must have healed without leaving scars or deformity. Duodenal ulcer was more frequent than gastric ulcer. Male predominance was seen with duodenal ulcer as well as gastric ulcer. These data are comparable to similar studies from the West.[1-3] The lifetime prevalence of peptic ulcer in North India in the present study was also similar to the projected figure of Ivy.[10]

The clinical behaviour of peptic ulcer in India is different to that in the West. In India, peptic ulcer is less likely to bleed or perforate and more likely to cause stenosis and gastric outlet obstruction.[5] Conflicting data come from other centres[11] which have shown a much higher incidence of perforation (25%) and lower incidence of ulcer bleed (4·5%) and pyloric stenosis with obstruction (6·1%). Malhotra[9] found a higher incidence of pyloric stenosis (20%) than ulcer bleed (12·1%) and perforation (10%) in South India and unusually high incidence of ulcer bleed (30·5%) in Assam, North East India. These data have been obtained from hospital series. The present study revealed that all three complications of peptic ulcer disease in Kashmir occurred in frequencies similar to those in the West. The reported incidence of peptic ulcer bleed has varied from 16–23% and of ulcer perforation from 3–19% in the West.[12]

Epidemiological data from India suggest that peptic ulcer is more common in the poor.[11,13] Raghvan[11] found that the highest incidence (56·5%) of peptic ulcer was among the semiskilled workers and the lowest (2·5%) in professional and managerial group. This was so, even with the fact that the

amenities and conditions of work were better and responsibilities of work were less for the semi skilled workers. Malhotra, however,[9] found that the incidence of peptic ulcer was more or less identical in the lower as well as in the higher income groups. Figures from the United Kingdom and the United States suggest that ulcer, gastric and duodenal, tend to be more common in the poor than in the rich.[4] The data referred to, however, were either drawn from the hospital based studies or autopsy surveys and therefore, do not represent the actual frequency of peptic ulcer in the general population. Peptic ulcer disease in Kashmir had no correlation with socioeconomic status, disproving earlier observations that peptic ulcer was a disease of poor communities.

India is a large country with different cultural and dietary habits, which may produce regional differences in frequency and the natural course of peptic ulcer. Early observations showed that peptic ulcer was more common among the population of South India than North India.[5 6] A relatively high frequency of peptic ulcer in South India was attributed to the sloppy diet which required little mastication. It was shown that saliva had a buffering capacity and protective effect on the production of peptic ulcer.[14] Population surveys and the multicentric study conducted by the Indian Council of Medical Research, on the prevalence of peptic ulcer, however, failed to confirm such regional differences.[15–17] The lifetime prevalence of peptic ulcer was 0·61% in Delhi,[16] 0·69% in Chandigarh,[17] and 0·75% in Madras.[15] These studies were limited by use of a barium meal as the method of diagnosis, however, and the asymptomatic population was not screened consequently. These studies underestimated the prevalence of peptic ulcer in the general population.

Similar prospective controlled endoscopic studies, based on random sample of the total population rather than on a hospital population or on a sample of patients who visit a physician, need to be conducted from other parts of India to define regional differences in the prevalence and clinical behaviour of peptic ulcer disease.

References

1 Kurata JH, Haile BM. Epidemiology of peptic ulcer disease. *Clin Gastroenterol* 1984; **13:** 289–307.
2 Monson RR, MacMohan B. Peptic ulcer in Massachusetts physicians. *N Engl J Med* 1969; **281:** 11–5.
3 Ihamaki T, Varis K, Siurala M. Morphological, functional and immunological state of the gastric mucosa in gastric carcinoma families. *Scand J Gastroenterol* 1979; **14:** 801–12.
4 Langman MJS. Peptic ulcer epidemiology. *Clin Surg Int* 1983; **7:** 1–13.
5 Dogra JR. Incidence of peptic ulcer in India with special reference to South India. *Indian J Med Res* 1941; **29:** 665–76.
6 Malhotra SL. Peptic ulcer in India and its etiology. *Gut* 1964; **5:** 412–6.
7 Kuppuswamy B. *Manual of socio-economic status scale (urban).* Delhi: Manasayan, 1976.
8 Araki S, Goto Y. Peptic ulcer in male factory workers: A survey of prevalence, incidence and aetiological factors. *J Epidemiol Community Hlth* 1985; **39:** 82–5.
9 Malhotra SL. Epidemiological study of peptic ulcer in the South India. *Gut* 1967; **8:** 180–8.
10 Ivy AC. The problems of peptic ulcer. *JAMA* 1946; **132:** 1053–9.
11 Raghvan P. Epidemiology of peptic ulcer in an urban community in Chandigarh, Bombay, India. *Gastroenterology* 1962; **42:** 130–43.
12 Litton A, Murdoch WR. Peptic ulcer in South West Scotland. *Gut* 1963; **4:** 360–6.
13 Konstam PG. Peptic ulcer in India. *Indian J Med Sci* 1959; **13:** 486–92.
14 Malhotra SL, Saigal ON, Mody GD. Role of saliva in the aetiology of peptic ulcer. *Br Med J* 1965; i: 1220–2.
15 Madangopalan N, Balakumar K, Jaishreegajraj A. Epidemiology of peptic ulcer in India. *Indian J Gastroenterol* 1985; **5** [suppl]; 3–6.
16 Shiela Chuttani C, Wig KL, Chabbra TD, Vasudeva YL, Gadekar NG. Epidemiology of peptic ulcer. I. Prevalence of peptic ulcer in our urban community in Delhi. II. Significance of various epidemiological factors. *Indian J Med Res* 1967; **55:** 1121–39.
17 Sehgal AK, Chuttani PN, Gupta BB. Epidemiology of peptic ulcer in an urban community in Chandigarh. *Indian J Med Res* 1971; **59:** 1612–20.